

**Swedish work with personnel prognoses  
for child care, schools, and adult  
education**

November 2001

## Preface

In Sweden, teacher prognoses have been compiled by the government for many years. Since 1996, this responsibility has been assigned Skolverket (the National Agency for Education – NAE). The calculation work is done by Statistics Sweden (SCB), commissioned by the NAE. The main users of the prognoses are the Ministry of Education and Science, the universities and colleges with teacher training programs, and the country's municipalities. The results of SCB's calculations have been published in the NAE report series.

This short report is an attempt to describe how this prognosis work is carried out. We have chosen to do this in three ways, first, via a general description of the work, secondly, by presenting the calculation model used by SCB in consultation with the NAE and thirdly, by presenting the findings of the most recent prognosis. This recent prognosis covers some 55 percent of the teachers in upper secondary school and upper secondary adult education and refers to teachers in subjects like history, biology, mathematics, Swedish, and modern languages. The report is based on an abbreviated version of NAE report 199. From the example, it is clear what assumptions were made and what effect alternative assumptions would have had on the calculations. Furthermore, the example shows how the results are presented.

It is the hope of the National Agency for Education that the following description of Swedish prognosis work will be of interest in many ways, for example, as a means of comparing Swedish work with similar work in other countries. Perhaps it will also serve as an inspiration to develop the prognosis work in other countries, which have not yet come as far in this area.

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Birgitta Andrén  
Division manager

Gunnar Enequist  
Director of Education

# 1. General description

## 1.1 The task of the National Agency for Education

A supply of educated teaching staff is one of the prerequisites for quality in pre-school, school, and adult education activities. In turn, this supply is dependent on the correct number of teachers being educated at teachers' colleges. In the work of determining the appropriate dimensions for teacher training, the Ministry of Education and Science has a central role. In its annual appropriations proposal, the ministry sets up goals for the universities and colleges regarding how many teachers should be graduated. Decisions regarding the number of openings for various categories of teachers, however, are made by each individual college.

To determine these dimensions, there is a need for prognoses of the demand and supply of teaching personnel. Since July 1, 1994, the National Agency for Education (NAE) has been responsible for this prognosis work. Certain starting points for the prognosis work have been laid down by the government in its development plan for the educational system (1993/94:183), where it says, among other things:

“The work of teacher prognoses should be carried out in such a way that the findings can be used both in decisions on the required number of graduating teachers and as a platform for planning and decision-making among colleges and municipalities. An important goal is to determine...the uncertainty factors mentioned above. ... Sensitivity analyses become...important and the models that are used should be made "transparent," so that the effect of changing the assumptions at central points can be easily tested.”

## 1.2 Prognoses produced to date

Over the years that the NAE has been responsible for the work, prognoses for a number of personnel categories have been made. These prognoses have been presented in various publications. The first prognoses were of a comprehensive nature, while the later ones were more specific:

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|---|----------------------|
| 1. Teacher shortage or teacher surplus?   | Report no. 81, 1996  |
| 2. The need to educate teachers in general subjects   | Report no. 112, 1996 |
| 3. Teachers in special schools (for the mentally handicapped).  | Report no. 132, 1997 |
| 4. The need to educate teachers in vocational subjects.   | Report no. 143, 1998 |
| 5. Teachers in primary-secondary school and in practical and artistic subjects in upper secondary school. | Report no. 151, 1998 |
| 6. Preschool teachers and after-school instructors.   | Report no. 158, 1998 |
| 7. Teachers in upper secondary schools and upper secondary adult education.                               | Report no. 199, 2001 |

## 1.3 Participation in prognosis work

The prognosis work is coordinated by the NAE. The practical work of producing the prognoses is the responsibility of the Forecasting Institute at Statistics Sweden (SCB). A

reference group is also connected to the work, with a broad representation from the Swedish Association of Local Authorities, the National Agency for Higher Education, the teachers' unions, some universities and colleges, and a few separate municipalities.

In its appropriations proposal for universities and colleges, the government indicates that when decisions on the dimensions of teacher training are being taken, consultation should be made with the National Agency for Higher Education and the NAE. In recent years, to render this consultation more effective, the two agencies have organized joint conferences for all the universities and colleges concerned.

#### **1.4 How the calculations are made**

Work on the prognoses is extensive. It is carried out according to essentially two main aspects. The first concerns calculating the teacher demand, which in turn is divided up into total demand, recruitment demand, and graduation demand. The second aspect concerns calculating the teacher supply, with the assumption that today's dimensions of teacher training will continue to apply in the future.

Below follows a brief description of the teacher directory that is the basis for the prognoses and a description of the calculation models. When it comes to pedagogical personnel for nursery schools and some after-school programs, the calculations present special problems. A brief presentation of these problems also follows.

##### *Teacher directory*

Sweden has for many years had a directory of teaching staff for most school forms. This directory is organized according to the Swedish system of birth dates and contains information about each teacher's educational background and current employment. The information on employment is updated once a year by collecting information from the schools or their governing boards. The information on educational background is updated with the help of, among other things, SCB's directory of degrees taken at universities and colleges.

The teacher directory constitutes the basis for the NAE teacher prognoses. It provides essential basic information about the existing teaching corps in the form of gender and age composition. Furthermore, it makes it possible to calculate, among other things, retention rates (how long teachers stay in the profession) and teacher proneness (the percentage of newly graduated teachers who begin to work as teachers).

##### *Calculating total demand, recruitment demand, and graduation demand*

In calculating the total teacher demand, the prognosis work begins with the number of teachers now working in the schools. This is projected with the help of an estimated student development, based on a population prognosis. At the same time, an assumption is made concerning future pupil-teacher ratio (i.e., the number of students per teacher). Any planned changes in curricula and schedules are also taken into consideration.

The recruitment demand is defined as the difference at a certain timepoint between the estimated total demand for teachers and the projected supply of certified teachers. The first comparison point between demand and supply lies five years into the future. The present teaching corps is projected with the help of assumptions concerning retention rates (i.e., the percentage of teachers who will still be in the profession after five years).

The recruitment demand for the next five-year period is calculated on the assumption that the desired number of teachers during the first five-year period will be attained. The new graduates are added to the projected teaching force. The resulting partially new teaching force is projected for five years and compared to the estimated total demand at the end of the five-year period. In this way, the calculations are then repeated in five-year stages. The final stage of the chain includes an estimate of how many teachers need to graduate to meet the recruitment demand. The estimate is based on statistics of previous years' teacher proneness, that is, the extent to which newly graduated teachers have started working as teachers.

#### *Estimated supply of teachers based on today's dimensions*

By comparing the calculated total teacher demand with the calculated supply, a picture emerges of the balance situation in the future, assuming that nothing is changed in the present dimensions.

The body of certified teachers at the starting point, that is, in the beginning year of the prognosis, is projected for five years with the help of assumptions of retention rates. These are calculated, as with the demand, as the percentage of teachers who are still in the profession after five years.

The new supplement of teachers, who have graduated during this five-year period, is calculated by multiplying the number of graduates by the rate of teacher proneness. The new graduates are distributed according to age and gender.

The calculated supplement of newly graduated teachers is added to the calculated number of teachers remaining in the profession. The resulting figure is the expected supply of teachers in five years. The procedure is then repeated for the next five-year period.

#### *Special problems regarding preschool teachers and after-school instructors*

The information in the NAE teacher directory does not include any preschool teaching staff and only some of the staff who work in after-school programs. Therefore, to calculate the demand and supply of preschool teachers and after-school instructors at the starting point, other sources must be used. These – including NAE group personnel statistics and SCB's directory of primary municipality personnel – are not as well adapted to the needs of the prognoses as the teacher directory. For example, as is evident from its name, the directory of primary municipality personnel does not cover employees in the private sector. For this reason, information about employees in the private sector has to be collected from childcare statistics, but certain estimates (as to age and gender distribution, for example) must then be made. When totaled together, these special conditions mean that the prognoses pertaining to preschool teachers and after-school instructors may contain larger uncertainties than the prognoses for other personnel categories.

## **2. Calculation models in prognosis work**

In this section, there is a presentation of the three-part model that Statistics Sweden uses in preparing its prognoses for teacher training. The model is adjusted to the latest prognosis for certain teachers in upper secondary schools (see third section), but

provides a generally speaking good picture of the basic principles applied in the prognosis work as a whole.

## **2.1 Model A**

Figure A presents the model used for calculating the total number of required teachers and the recruitment need per subject.

### *Calculation of total need (1)*

The number of active teachers per subject and school form or program in autumn, 1999, was taken as the starting point for calculating the total need. Figures were available for three groups of programs at the upper secondary school level (science and social science programs, individual programs, and other programs) and for all upper secondary adult education. The future required number of teachers per subject was calculated based on assumptions of changes in school schedules, in the number of students per program/school form, and in pupil-teacher ratio. After this, the need of subject teachers was calculated by multiplying by a percentage of subject teachers<sup>1</sup> per subject, program, and school form.

The same teacher may be employed at both an upper secondary school and within upper secondary adult education and/or with different upper secondary school programs. In summing up school form or program, these teachers get counted more than once. A net count per subject is therefore required.

### *Projection of certified subject teachers (2)*

The number of actively employed and certified subject teachers in 1999 is then projected per subject for five years at a time using certain assumptions of how many teachers, per gender and age, will remain in active service (retention rates). These frequencies are adjusted upwards to make allowances for returns to the profession. To make allowances for changes in leaves of absence due to the fact that the teaching staff is aging, the number of teachers is multiplied by assumptions of predicted changes per gender and age.

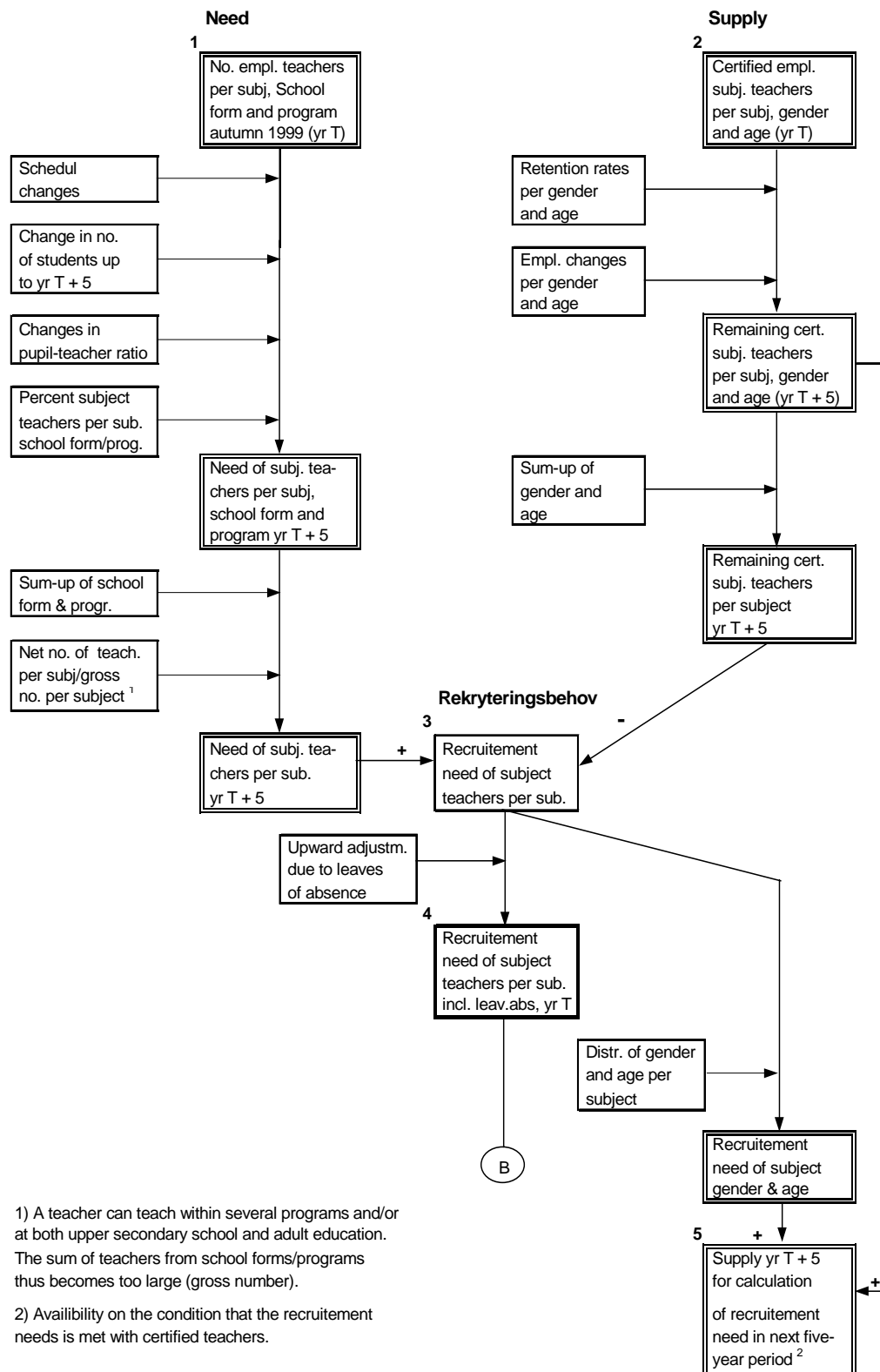
### *Calculation of recruitment need per subject (3)*

The recruitment need is composed of the difference between the total teacher need and the projected availability of certified teachers. In the model, the recruitment need is calculated for a five-year period, but refers in reality to the situation during the last year of the period. Moreover, the recruitment need refers to newly-graduated teachers. In other words, it signifies the number of newly graduated teachers who must still be working at the end of the five-year period of all the newly graduated teachers recruited during the period. In this step, the recruitment need is composed solely of actively employed teachers during the years T+5.

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<sup>1</sup> Other categories of teachers than subject teachers may give instruction on the subjects covered by the prognosis, for example, the so-called two-subject teachers, who are teachers in practical-esthetic subjects and a general subject or teachers in vocational subjects and a general subject. Teachers with a permanent post at the primary-secondary school level and special teachers who work at upper secondary schools or in upper secondary adult education are not included in the calculations either.

**Figure A Calculation of total need and recruitment need per subject**



#### *Recruitment need including teachers on leave of absence (4)*

Of those who were recruited during the period, some are on a leave of absence at the end of the period. In this step, the recruitment need is calculated upwards to include these teachers as well. Model B is used to calculate how many graduated teachers are necessary to fill the recruitment need.

#### *Supply based on an assumption of balance (5)*

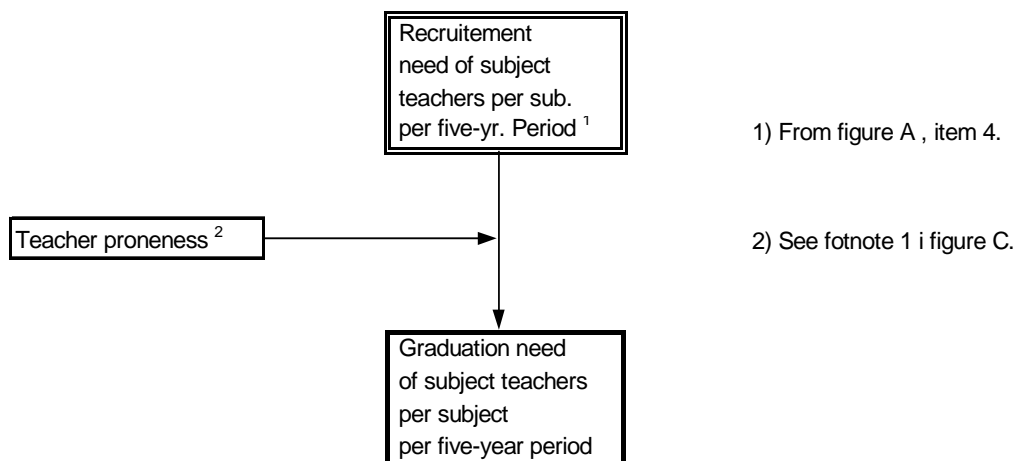
With the exception of the first period, the calculation of the recruitment need is based on the assumption that there is a balance between total need and total supply in the beginning of each five-year period. In the calculations, this supply must be distributed according to age and gender. For this reason, assumptions are made about the distribution of age and gender among those who are to be recruited. The recruitment need, distributed across gender and age, is added to the so-called stock, that is, the teachers who are still part of the teaching staff of five years previous. The result (item 5 in the figure) comprises the starting value for the supply at item 2 in the figure during the following five-year period. Note that if the recruitment need has not been met during the period, the starting value is lower and the recruitment need during the coming period will be greater than expected.

## **2.2 Model B**

Figure B shows the model for calculation of graduate need per subject.

The graduate need is calculated by dividing the recruitment need per subject by the teacher proneness rate. In this context, teacher proneness means the percentage of graduated teachers over a five-year period who are working as teachers at the end of the period. Teacher proneness has been assumed to be the same for all subjects.

**Figure B Calculation of graduate need per subject**



## 2.3 Model C

Figure C presents the model for calculating the future supply of certified teachers if teacher training programs are retained according to present dimensions.

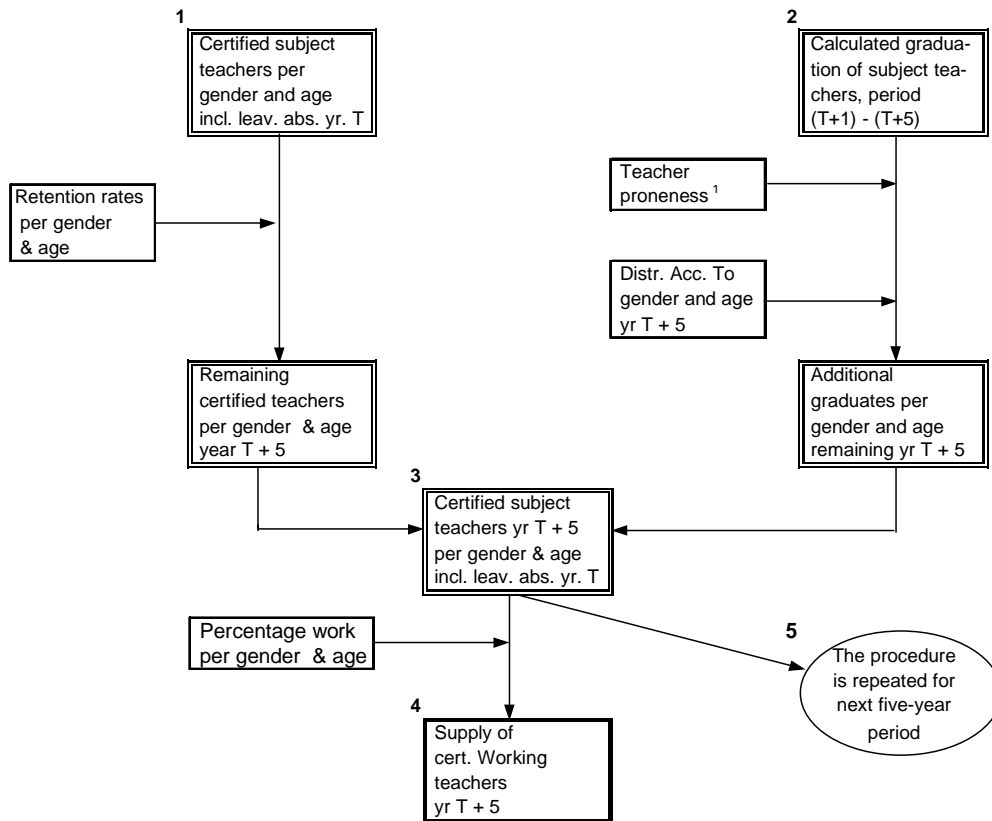
The body of certified teachers including those on leave of absence at the starting point is projected for five years with the help of assumptions regarding retention rates, varying according to age and gender. (1)

In a separate model (not presented here), the number of newly graduated teachers per five-year period is calculated. This supplement of certified teachers is obtained by multiplying the number of new graduates by the assumption of teacher proneness. The new graduates are distributed according to age and gender. (2)

The supplement of new graduates is added to the calculated number of teachers remaining in the profession, whereby the total supply of teachers in five years' time is obtained (including those on leaves of absence). (3)

The supply of working teachers is calculated through multiplication with the assumptions of the proportion of working teachers per gender and age. The procedure is repeated for the next five-year period. The result at item 3 constitutes the starting value for item 1. (4)

**Figure C Calculation of future supply of teachers**



1) = the percentage of graduates during a five-year period who started as teachers during the period and who still are working as teachers at the end of the period.

### **3. An example of prognoses <sup>2</sup>**

#### **Teachers in upper secondary schools and upper secondary adult education – supply and demand of teachers in most core subjects and certain program-specific subjects**

**The need for subject teachers in upper secondary schools will increase sharply in the upcoming ten-year period as a result of large youth cohorts. At the same time, large numbers of teachers are expected to retire. A total of 14,500 subject teachers need to be recruited up to the year 2009 to fill the demand in upper secondary schools and upper secondary adult education. The number of newly graduated teachers will not be enough, according to calculations, to cover the recruitment need. A rise in the shortage of certified teachers is therefore expected. This development is expected to turn in around the year 2010, when the number of students in upper secondary school is expected to decline markedly. Accordingly, the recruitment need of subject teachers will decrease.**

#### **The extent of the calculations**

This report covers the calculations of demand and supply for upper secondary school teachers in a majority of core subjects<sup>3</sup> and certain program-specific subjects in upper secondary schools and upper secondary adult education. This teacher group is equivalent to the group formerly called subject teachers. In autumn 1999, this group included more than half of all teachers in upper secondary schools and upper secondary adult education.

The calculations pertain to the period of 1999-2019 and show the recruitment need and the graduate need per teaching subject and five-year period. These are calculated so that a balance between supply and demand is attained at the end of each five-year period.

The calculations also include an estimate of the expected number of teachers according to the present dimensions of teacher training. By comparing with the calculated need, a picture emerges of the situation that might arise if today's dimensions are retained.

#### **Base alternatives and sensitivity analyses**

The calculation results are presented in the form of a base alternative supplemented with sensitivity analyses. Sensitivity analyses show the impact of changing the assumptions used to make the calculations.

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<sup>2</sup> Excerpt, translated from the Swedish, of National Agency for Education report 199

<sup>3</sup> Core subjects mean subjects that are common to all the national and all the specially designed programs of the upper secondary school. They are: Swedish/Swedish as a Second Language, English, Mathematics, Social Studies, Religion, Science, Physical Education and Health, and Practical and Artistic Subjects. The latter two subjects, however, are not included in the calculations of this report.

## **18 percent with no pedagogic training, autumn 1999**

In the autumn of 1999, an average of 18 percent of all teachers of subjects covered by the prognosis lacked pedagogic training. A third of these teachers, however, had permanent posts, which can be interpreted to mean that the school judged them to be competent for the job. The others, 12 percent, had neither pedagogic training nor permanent contracts. In the report, these teachers are considered uncertified. The proportion of uncertified teachers varied from subject to subject, from 4 percent (for German) to 24 percent (for computer science). Upper secondary adult education had a higher share of uncertified teachers than upper secondary schools. This applied especially to computer science subjects and economics subjects. For the core subjects, the differences between upper secondary school and upper secondary adult education were small.

Note that the figures for uncertified teachers are not linked to the teaching subject but to teacher training as such. Thus, the percentage of teachers who lacked training in their particular teaching subject may be higher, lower, or equal to the given percentage of uncertified teachers.

## **Nearly 30 percent more students in upper secondary school in 2008**

The number of students on the upper secondary level is expected to increase by 29 percent up to the year 2008, as compared to 1999. A somewhat higher proportion as compared to 1999 is expected to be enrolled in science, social studies, and technology programs. In upper secondary adult education, the number of students is expected to decrease as a result of the discontinuation of Swedish government-promoted adult education (the so-called *Kunskapslyftet*) in 2002 and a substantial decrease in the number of student vacancies financed by government grants.

Changes in student population are expected to lead to an increased need for subject teachers in upper secondary schools and upper secondary adult education of 13 percent up to the year 2008, from 19,000 to 21,400 actively employed teachers. The reason the increase isn't larger is mostly because the number of teachers in upper secondary adult education has been assumed to decrease by 25 percent. Furthermore, class sizes in upper secondary schools are expected to be enlarged when the number of students increases.

## **Major decrease after 2008**

After 2008, the need for teachers will decrease as a result of the smaller number of young people of upper secondary school age. As early as 2012, the need is expected to have reverted to today's level and to continue to decrease a few years more. Developments after 2016 are uncertain, since they depend on how many children will be born.

## **More difficult to predict students' subject choices**

The future need of teachers in different subjects has become more dependent on students' choice of specialization and subject than has been the case previously.

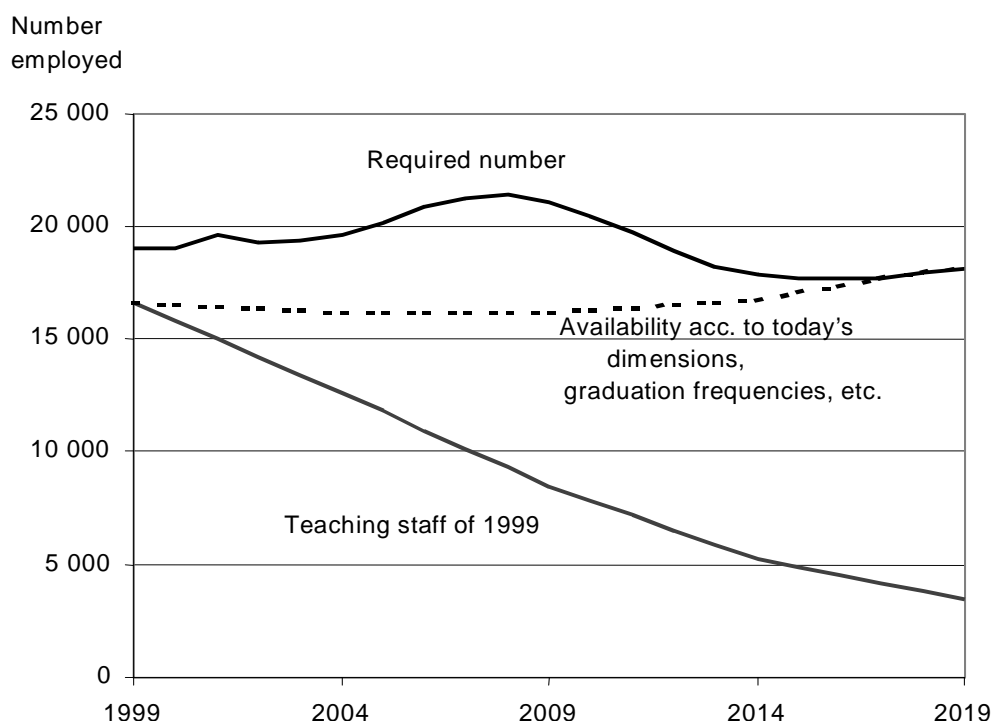
Beginning in the school year of 2000/2001, students were allowed greater options in upper secondary school, partly by increasing the number of subject choices within the framework of each program and partly by expanding programs to include 300 credits instead of the earlier 190. Since it is difficult to foresee which choices students will make, the calculations assume the same distribution of subjects in different programs in upper secondary schools and upper secondary adult education, respectively, as applied in 1999, with one exception: In vocational programs, instruction in Swedish, Swedish as a second language, English, and Mathematics is assumed to increase, since the guaranteed number of teaching hours will be heightened. The primary aim of this increase is to improve student scores in these subjects.

### High retirement rate

More than a third of the subject teachers in autumn, 1999, were 55 years of age or older. A large segment of today's teaching force will thus be eligible for retirement during the upcoming ten-year period. Many will also leave the school sphere a year or two ahead of time. A total of more than 40 percent of today's teachers are expected to leave their jobs up to the year 2009 due to retirement or other resignation after the age of 60. There will also be retirements among younger teachers.

The addition of newly graduated teachers based on the present dimensions of teacher training is probably not enough to cover the resignations of today's teaching staff. The availability of certified subject teachers in upper secondary schools and upper secondary adult education is therefore expected to decrease somewhat up to the year 2009, from 16,600 to 16,100 (actively employed teachers). After 2009, however, the number of retirements will decrease and the supply of teachers will increase.

**Diagram A: Supply and demand of subject teachers in upper secondary school and upper secondary adult education 1999-2019. Base alternative**



## **Increasing shortage**

At the prognosis starting point, in autumn 1999, the lack of certified teachers was estimated to be 2,400 (19,000 minus 16,600). This shortage is expected to continue to increase, up to as many as 5,300 in 2008, which is primarily a result of the increase in the total need of teachers. Part of this shortage will probably be alleviated, however, when some teachers from primary-secondary school transfer to upper secondary school. According to earlier experience, such a transition could mean as many as 1,000 teachers per five-year period.

After 2008, the shortage will decrease, as the total subject teacher need will decrease while their availability increases. Developments are thus moving toward a balance between supply and demand. Toward the end of the prognosis period, in 2018-2019, the calculations even point to a small surplus of educators.

## **Major recruitment need in the next ten years**

The calculated recruitment need is based on the assumption that all teachers should be certified. According to the base alternative, 7,800 teachers need to be recruited during the first five-year period, and 6,700 during the second. The recruitment need of the first period includes replacements for those teachers who were not certified in 1999. After 2009, the recruitment need will decrease drastically as a result of the decrease in the total teacher need. If it were possible to recruit as many certified teachers as will be needed up to the year 2009 – and if the number of teaching posts then begins to decrease – only 1,100 teachers would need to be recruited during the period from 2010 to 2014.

Expressed in absolute numbers, the recruitment need during the 2000-2009 period is greatest for the most commonly offered subjects on the upper secondary school level, namely: Swedish, Mathematics, and English, in that order. These subjects are also the most commonly offered within upper secondary adult education.

Relatively speaking, the greatest recruitment need in 2009 is for teachers of “other languages” (other languages than Swedish, English, French, Spanish, and German). This is partly because the lack of certified teachers for “other languages” was considerable even before the starting point in autumn, 1999. The recruitment need in French, Spanish, and German is also greater than in for example Swedish and English, when they are set in relation to the total need of teachers in the respective subject.

## **Sensitivity analyses**

For several variables included in the calculations, alternative assumptions have been made. Table A presents the effects of these assumptions on the recruitment need. If, for example, the proportion of teachers who leave their jobs is one percent lower per year than the assumption made in the base alternative, the total recruitment need for the period 2000-2009 decreases by 1,700. If the early retirement rate is lower, so that 15-20 percent more teachers between 60 and 64 years of age remain in the teaching profession, then the need to recruit would be 800 fewer teachers than in the base alternative for the period 2000-2009.

**Table A: Recruitment need per five-year period. Base alternative with sensitivity analyses**

	Period <sup>1</sup>				Total <sup>1</sup>
	2000-2004	2005-2009	2010-2014	2015-2019	2000-2009
<b>Base alternative</b>	<b>7 800</b>	<b>6 700</b>	<b>1 100</b>	<b>3 800</b>	<b>14 500</b>
<b>Sensitivity analyses</b>					
<i>Deviation from base alternative <sup>2</sup></i>					
Effect of high credits <sup>3</sup>	+2 300	+300	-200	+300	+2 600
Pupil-teacher ratio 5% higher than	+1 200	+1 000	-1 300	+300	+2 200
Activity in adult education as in 1999	+1 200	+100	+100	+100	+1 200
1% higher retirement per year	+900	+800	+700	+600	+1 700
Higher early retirement (+ c. 15%)	+700	+100	-200	0	+800
Pupil-teacher ratio as in 1999 (100% compliance)	+600	+500	-1 100	+100	+1 100
More students in SC/SS/TE (+3%)	+200	0	0	0	+200
5 % non-accredited teachers	-1 100	-200	+100	-100	-1 200
1% lower retirement per year	-900	-700	-600	-500	-1 700
Lower early retirement (- c. 15%)	-700	-100	+200	0	-800
Pupil-teacher ratio: 50 % compliance	-600	-500	+1 100	-100	-1 100
Fewer stud. in individ. progr. (-6%)	-300	0	0	0	-300

1) If it is not possible to recruit as many teachers as are designated for a period, a corresponding part of the recruitment need is shifted to the next period. Since it is likely that the recruitment need will not be satisfied during the first period, it is better to study the total recruitment need for the first two periods.

2) The deviation from the base alternative will be negative for certain variables in the third period despite the fact that they were positive in prior periods. This is due to the fact, among other things, that the recruitment need is based on an assumption of balance in the previous period and the supply is thus larger than in the base alternative. Teachers in the base alternative who need to be recruited during the third period have in these alternatives been recruited during prior periods.

3) The total number of credits has been raised for upper secondary schools, without the guaranteed number of teaching hours being raised. This alternative shows the effect that would have been obtained if the rise in credits had led to more teaching anyway and had its full impact in 2004.

### **Graduation need and expected graduation**

If the entire recruitment need of 14,500 teachers up to 2009 were to be fulfilled by newly graduated teachers, a total of 19,400 teachers would have to receive their degrees during the period from 2000-2009. This can be compared to an expected graduation body of 11,600 teachers based on today's dimensioning of teacher training and today's graduation frequencies.

The estimated graduation need is based on the assumption that 75 percent of those who graduate during a five-year period will be working in upper secondary schools or upper

secondary adult education at the end of the period. If the teacher shortage increases, it would make it easier for graduates to get jobs in the subjects they are trained for and in the town of their choice. Competition for teachers could mean raises in salaries. Both of these factors might induce a larger percentage to enter the teaching profession. If we assume instead that 80 percent of graduates will be working in upper secondary schools or upper secondary adult education at the end of the period, the graduation need would stop at slightly over 18,000 teachers. The assumed teacher proneness thus has a significant impact on the estimated graduation need.

Even if we should assume, which hardly seems likely, that all of the 11,600 newly graduated teachers enter the teaching profession, their number is not enough to fill the recruitment need. On the other hand, we can expect that part of the need will be met by teachers of upper grades on the primary-secondary school level (perhaps after certain further training) transferring and beginning to teach at upper secondary schools. In addition, the need for teachers on the primary-secondary school level will probably decrease when the large cohorts of children born in the late 1980s leave primary-secondary school and go on to upper secondary. With the present dimensions of teacher training, however, there is still a high risk that a large segment of teachers on the upper secondary level will not have teacher training in the future.

According to the calculations, the graduation need will decrease drastically after 2009. This assumes, however, that as many certified teachers are recruited as are needed up to the year 2009. Otherwise, the graduation level obtained by today's dimensioning will also be required for the period from 2010-2014.

**Table B: Graduation need and expected graduation of subject teachers per five-year period**

	Period				Total 2000-2009
	2000-2004	2005-2009	2010-2014	2015-2019	
Required no. of graduates					
Base alternative <sup>1</sup>	10400	8900	1400	5000	19400
Base alternative, but with higher teacher proneness <sup>2</sup>	9800	8400	1300	4700	18100
Expected graduation rate with today's dimensioning of teacher training	5200	6400	6500	6500	11600

1)Teacher proneness expected to be 75 %.

2)Teacher proneness expected to be 80 %.

**Table C: Recruitment requirement and graduation requirement of subject teachers, period from 2000-2009**

Subject group/subject	Recruitment requirement		Graduation requirement	
	Total 2000-2009	% of total number subject teachers in 2009 <sup>1</sup>	Total 2000-2009	Average per year
<b>Civic and behavioral- science subjects</b>				
History	1 540	61	2 050	210
Religion	900	54	1 200	120
Social studies	1 870	57	2 490	250
Other pertinent subjects	1 530	60	2 040	200
<b>Mathematical and scientific subjects</b>				
Biology	630	52	840	80
Computer sc./Computer use	1 740	69	2 330	230
Physics	1 310	68	1 750	180
Chemistry	870	58	1 160	120
Mathematics	3 580	66	4 780	480
Science	1 030	53	1 380	140
Technology (equiv.)	640	71	860	90
Other pertinent subjects	400	59	540	50
<b>Languages (not native tongue)</b>				
English	3 340	60	4 450	450
French	840	66	1 130	110
Spanish	580	70	780	80
Swedish	3 630	57	4 830	480
Swedish as a second lang.	370	57	490	50
German	1 190	67	1 590	160
Other languages	520	76	690	70
<b>Economic subjects</b>	1 120	61	1 490	150
<b>Other subjects</b>	1 280	56	1 700	170
<b>Sum, gross <sup>2</sup></b>	28 940	61	38 580	3 860
<b>Total, net <sup>2</sup></b>	14 520	63	19 360	1 940

1) Presented here is the portion of the total no. Subject teachers in upper secondary schools and upper secondary adult education in 2009 who need to be recruited during the period 2000 - 2009.

2) The teachers teach more than one subject on average, which renders the total number of teachers per subject larger than the net number of teachers.

## Summary of assumptions in the base alternative

Factor	Assumption
Population development	Net immigration 15,000 as of 2004, fertility 1.8 children per woman beginning in 2010
Students in upper secondary school	The number of first-year students corresponds to 118 percent of 16-year-olds. 16 percentage units refer to students in individual programs
Upper secondary adult education	Beginning in 2004, 75 % of the 1999 level
Changes in allocations of hours	More teaching in vocational programs in the subjects Swedish/Swedish as a second language (+10 hours), Mathematics (+10 hours) and English (+10 hours)
Pupil-teacher ratio	Varies with student enrollment, 75 percent compliance (beginning on the 1999 level)
Certification	All teachers are to be certified
Percentage of subject teachers	Corresponds to the percentage of subject teachers in 1999 (incl. teachers in unspecified posts)
Remaining/returning to teaching profession	Averages for the period 1991-1994
Mobility between school forms	Not included in the calculations. Presented separately
First-year students at teachers college	2,100 per year, of which 700 in short educational programs (practical-pedagogic or the like), as of 2000/01
Graduates from teacher training	Graduations frequency 55 % in long educational programs, 75 % in short. 1,300 graduates a year beginning in 2007
Teacher proneness	75 percent
Leaves of absence	Same percentage per gender and age as in 1999



National Agency for Education

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